CHAPTER II

STANDARD MAGAZINES

2-1. General. Standard magazines are preapproved for construction and are mandatory for use within the Department of Defense unless circumstances, such as less storage capacity, require a non-standard design. The advantages of standard designs are:

a. Design costs are saved.

b. obtaining approval from The DDESB is simplified.

c. Less real estate may be required because of certain decreased intermagazine separations permitted when standard magazines are used.

d. The user has confidence in the end product.

e. Flexibility of storage situations exists because magazines can be designed to varying lengths.

f. Because of certain reduced separation distances, less roads, fences, utilities, etc., may be required.

2-2. Description of Earth-Covered Magazines. A typical earth-covered magazine has the following features:

a. A semicircular arch, oval arch, or a rectangular box constructed of reinforced concrete or steel or a combination thereof.

b. A reinforced concrete floor slab, sloped for drainage.

c. A reinforced concrete rear wall.

d. A reinforced concrete headwall that extends at least 2-1/2 feet above the top of the magazine.

e. Reinforced concrete wingwalls on either side of the headwall. The wingwalls may slope to the ground or may adjoin wingwalls from adjacent magazines. The wingwalls may be either monolithic or separated by expansion joints from the headwall.

f. Heavy steel doors in the headwall (either manually operated or motorized).

g. An optional gravity ventilation system.

h. Earth cover over the top, sides and rear of the magazine.

i. Lightning protection and grounding systems.

2-3. Standard Magazines. Standard magazine designs have been developed in coordination with the Department of Defense Explosive Safety Board (DDESB) so that designs would be considered preapproved when called for in construction. The largest sizes are about 25 feet wide. The length can vary, but is usually 80 feet. Smaller magazines have widths ranging from approximately 8 feet to 14 feet, with the length also varying.

a. Drawings approved for new construction. These standard magazines, are for the most part, a complete set of construction drawings with accompanying specifications. The magazines must, however, be site-adapted for local conditions. These magazines designs are approved for storing 500,000 pounds and may be ordered from the U.S. Army Engineer Division, Huntsville.

(1) Semicircular steel arch - 33-15-65 (Figure 4)

(2) Reinforced concrete arch - 33-15-74 (Figure 5)

(3) Semicircular steel arch - 421-80-01 (Figure 6)

(4) Steel and concrete large box - 421-80-02 (Figure 7)

(5) Steel oval arch - 421-80-03 (Figure 8)

b. Older magazines found on Army installations:

(1) Mounded concrete - 33-15-06 (Figure 9)

(2) Atomic blast resistant - 33-15-58

(3) Stradley - 33-15-61 (Figure 10)

(4) Steel arch - AW 33-15-63

(5) Steel arch - AW 33-15-64 (Figure 11)

(6) Steel oval arch - 33-15-73

(7) Semicircular mounded concrete - 652 series

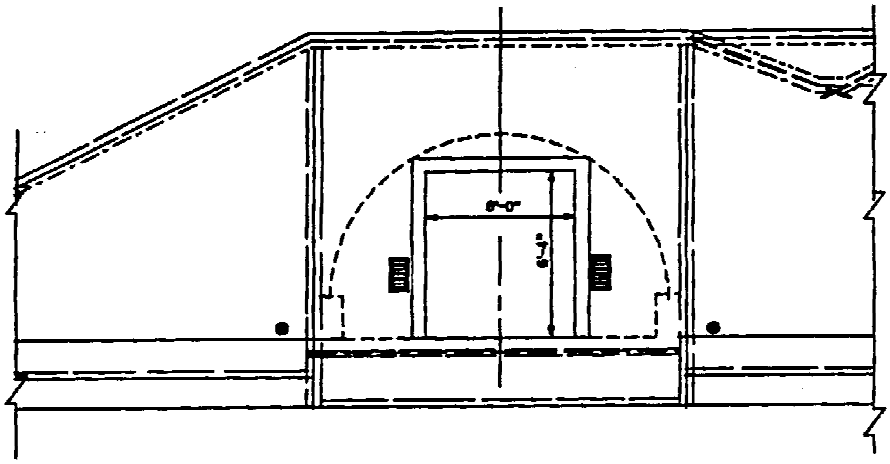

FIGURE 4. EARTH COVERED STEEL ARCH MAGAZINE

DRAWING NUMBER	33-15-65
ISSUE DATE	MARCH 1963
DIMENSIONS	WIDTHS: 8'-0", 10'-0", 12'-0" AND 14'-0" VARIABLE LENGTH TO 27' MAX
DOOR	HINGED, DOUBLE-LEAF 6'-0" x 6'-4"
EXPLOSIVE LIMIT	500,000 LBS. (NEW)
PHYSICAL SECURITY	HIGH SECURITY HASP (MIL-H-29181)
GENERAL FEATURES	1. HEADWALL - 1'-0" THICK REINFORCED CONCRETE 2. BACKWALL - 1'-0" THICK REINFORCED CONCRETE 3. ARCH - 8 GAUGE CORRUGATED STEEL
COMMENT	HEADWALL NOT EQUIVALENT IN STRENGTH TO 33-15-74 OR LATER DEVELOPED STANDARD MAGAZINE
DDESB APPROVAL DATE	15 MARCH 1965

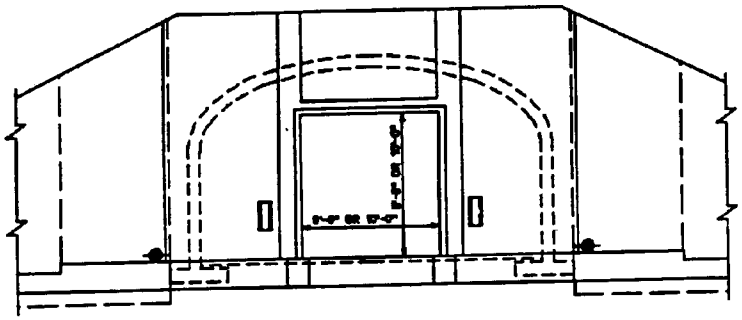

FIGURE 5. MAGAZINE, CONCRETE, OVAL-ARCH, EARTH-COVERED

DRAWING NUMBER	33-15-74
ISSUE DATE	APRIL 1979
DIMENSIONS	25'-0"Wx14'-0"H LENGTH VARIES: 60'-0" TO 90'-0"
DOOR	SLIDING, 8'-0"x8'-0" OR 10'-0"x10'-0"
EXPLOSIVE LIMIT	500,000 LBS. (NEW)
PHYSICAL SECURITY	HIGH SECURITY HASP NOT SPECIFIED
GENERAL FEATURES	1. WALLS - 1'-0" THICK REINFORCED CONCRETE 2. ARCH - 1'-0" THICK REINFORCED CONCRETE 3. PILASTERS - 2'-6"x1'-10" AT DOOR JAMBS
COMMENT	RECOMMENDED FOR NEW CONSTRUCTION. THE 8' VERTICAL WALL PROVIDES EFFICIENT AMMUNITION STORAGE
DDESB APPROVAL DATE	22 JULY 1980

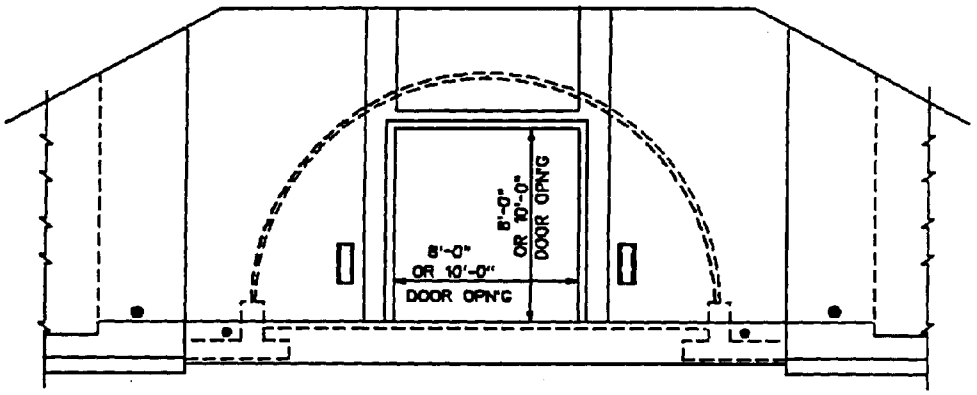

FIGURE 6. MAGAZINE, STEEL, SEMICIRCULAR-ARCH, EARTH-COVERED

DRAWING CODE	421-80-01
ISSUE DATE	MARCH 1963
DIMENSIONS	25'-0"W x 14'-0"H LENGTH VARIES: MAX. 89'-0"
DOOR	SLIDING, 8'-0" x 8'-0" OR 10'-0" x 10'-0"
EXPLOSIVE LIMIT	500,000 LBS. (NEW)
PHYSICAL SECURITY	HIGH SECURITY HASP (MIL-H-29181)
GENERAL FEATURES	1. HEADWALL - 1'-0" THICK REINFORCED CONCRETE 2. REARWALL - 1'-0" THICK REINFORCED CONCRETE 3. ARCH - 1 GAUGE CORRUGATED STEEL FOR 2" DEEP OR 5½" DEEP ARCHES 4. PILASTERS- 1'-10" x 2'-6" AT DOOR JAMBS
DDESB APPROVAL DATE	02 OCTOBER 1987

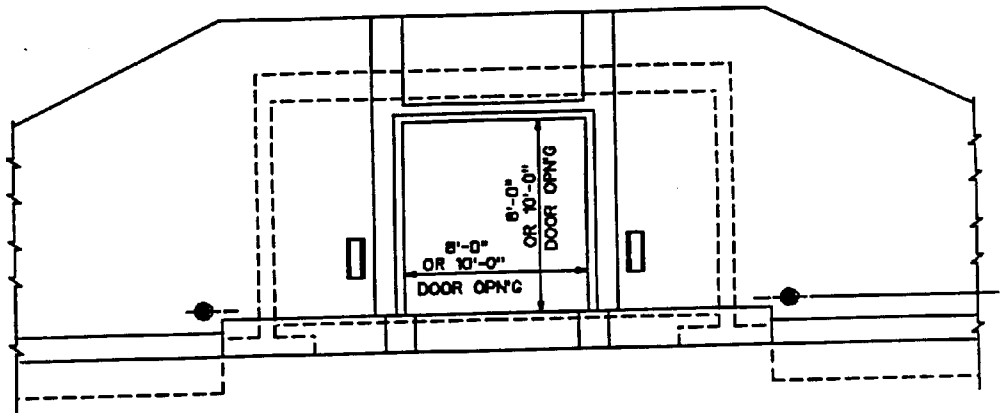

FIGURE 7. STEEL AND CONCRETE BOX MAGAZINE, EARTH-COVERED

DRAWING CODE	STD 421-80-02
ISSUE DATE	JUNE 1993
DIMENSIONS	24'-0"Wx11'-2"H LENGTH VARIES: MAX. 90'-0"
DOOR	SLIDING, 8'-0"x8'-0" OR 10'-0"x10'-0"
EXPLOSIVE LIMIT	500,000 LBS. (NEW)
PHYSICAL SECURITY	HIGH SECURITY HASP (MIL-H-29181).
GENERAL FEATURES	1. ROOF - 1'-6" THICK REINFORCED CONCRETE 2. WALLS - 10" THICK BFR PANELS 3. HEADWALL - 10" THICK BFR PANELS 4. PILASTERS - 2'-0"x2'-6" REINFORCED CONCRETE 5. WINGWALLS - BFR PANELS
COMMENT	BFR (BLAST AND FRAGMENT RESISTANT) PANELS ARE PATENTED
DDESB APPROVAL DATE	22 FEBRUARY 1993

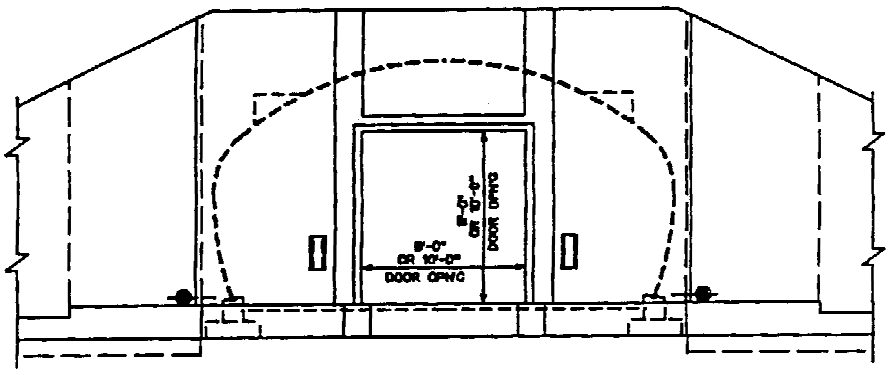

FIGURE 8. MAGAZINE, STEEL, OVAL-ARCH, EARTH-COVERED

DRAWING CODE	STD 421-80-03
ISSUE DATE	APRIL 1993
DIMENSIONS	25'Wx14'-5"H , LENGTH VARIES 21'-0" TO 89'-0"
DOOR	SLIDING, 8'x8' OR 10'x10'
EXPLOSIVE LIMIT	500,000 LBS. (NEW)
PHYSICAL SECURITY	HIGH SECURITY HASP (MIL-H-29181)
GENERAL FEATURES	1. HEADWALL - 1'-0" THICK REINFORCED CONCRETE 2. BACKWALL - 1'-0" THICK REINFORCED CONCRETE 3. ARCH - 1 GA. CORRUGATED PLATE 4. PILASTERS - 2'-6"x1'-10" AT DOOR JAMBS
COMMENT	THIS MAGAZINE REPLACES 33-15-73
DDESB APPROVAL DATE	28 DECEMBER 1992

MAG0352.DGN

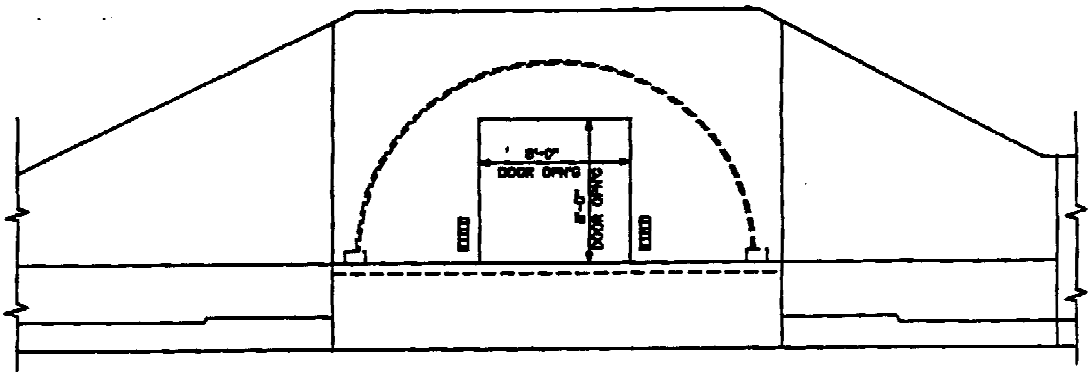

FIGURE 9. MAGAZINE, MOUNDED CONCRETE IGLOO

STANDARD MAGAZINE	33-15-06
ISSUE DATE	AUGUST 1951
DIMENSIONS	26'-6"Wx12'-9"H LENGTH VARIES: 81'-0" MAXIMUM
DOOR	HINGED, DOUBLE-LEAF 8'-0" x 8'-0"
EXPLOSIVE LIMIT	500,000 LBS. (NEW)
PHYSICAL SECURITY	NONE
GENERAL FEATURES	1. HEADWALL- 1'-0" THICK REINFORCED CONCRETE 2. REARWALL - 8" THICK REINFORCED CONCRETE 3. ARCH-THICKNESS VARIES, 6" @ CROWN 1'-4" @ BASE 4. PILASTERS- 1'-6" x 3'-4¾" AT DOOR JAMBS
COMMENT	THIS MAGAZINE SUPERSEDED DWGS 652-686 THRU 652-692 & 33-15-01
DDESB APPROVAL DATE	29 JULY 1955

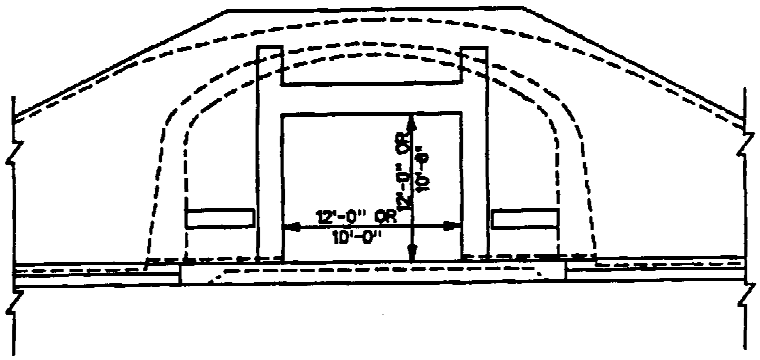

FIGURE 10. MAGAZINE, STRADLEY TYPE, EARTH-COVERED

DRAWING NUMBER	33-15-61
ISSUE DATE	DECEMBER 1959
DIMENSIONS	25'-0"Wx14'-0"Hx60'-0"L
DOOR	SLIDING, 10'-0"x10'-6" OR 12'-0"x12'-0"
EXPLOSIVE LIMIT	500,000 LBS. (NEW)
PHYSICAL SECURITY	NONE
GENERAL FEATURES	1. HEADWALL - 1'-0" THICK REINFORCED CONCRETE 2. REARWALL - 10" THICK REINFORCED CONCRETE 3. PILASTERS - 2'-4"x1'-8" AT DOOR JAMBS
COMMENT	THIS MAGAZINE REPLACES "YURT" MAGAZINE YT-106 THRU YT-111
DDESB APPROVAL DATE	30 DECEMBER 1959

MAGDES.DGN

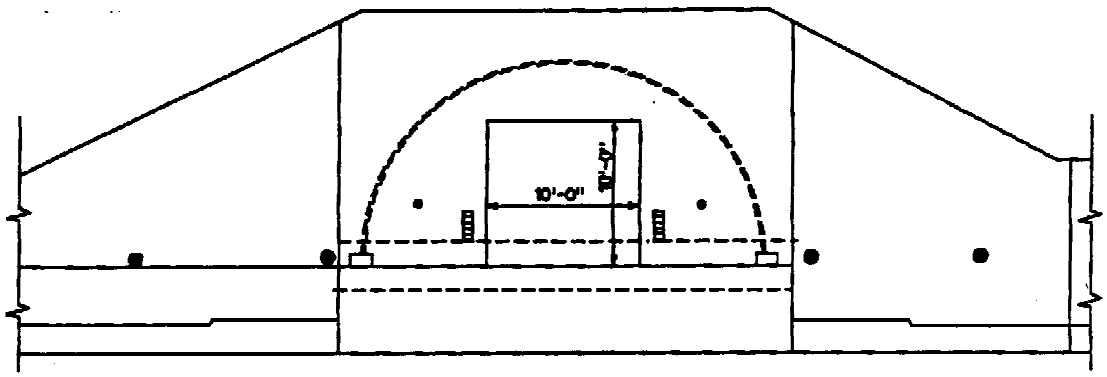

FIGURE 11. IGLOO, STORAGE, STEEL ARCH - EARTH MOUNDED

DRAWING NUMBER	AW 33-15-64
ISSUE DATE	MAY 1963
DIMENSIONS	25' x 14'-4"H x 59'L
DOOR	HINGED, DOUBLE-LEAF 10'x10'
EXPLOSIVE LIMIT	500,000 LBS (NEW)
PHYSICAL SECURITY	NONE
GENERAL FEATURES	1. REAR WALL- 1'-0" THICK REINFORCED CONCRETE 2. ARCH- 1 GA CORRUGATED STEEL 3. HEADWALL- 1'-0" THICK REINFORCED CONCRETE 4. PILASTERS- NONE
COMMENTS	1. HEADWALL NOT EQUIVALENT IN STRENGTH TO 33-15-74 OR LATER DEVELOPED STANDARD MAGAZINES
DDESB APPROVAL DATE	11 MARCH 1966

M64.DGN

2-4. Site-Adaptation. Standard magazines are meant to be site-adapted, that is, tailored to the peculiarities at each particular location. For magazines, this tailoring mainly involves the foundation and the drainage system. For instance, if the soil bearing pressures at the construction location is below the design value, then an increase in the footing width is necessary. Also, a deep versus a shallow foundation is influenced by the frost penetration depth at the particular site. Site-adaptation also includes determining magazine length and deciding whether ventilators are required. The protective construction of the magazine (arch, headwall and door) must remain unchanged. The 2-foot minimum earth cover must also be maintained.

2-5. Changes to Standard Designs. changes to standard designs, other than site adaptation, should not be made without coordination with the DDESB. Any change will invalidate the DDESB's approval and result in the magazine being considered non-standard. This may require greater Q-D separations for those magazines in certain situations.

2-6. DDESB Approval. Site plans for construction projects containing magazines must be submitted in accordance with AR 385-60 for review and approval by the DDESB for:

a. New construction.

b. Changes in utilization of facilities or mission affecting Q-D requirements.

c. Major modification to facilities.

2-7. Specifications. Specifications have been developed for each standard design, and are available with the drawings. Users can obtain a set of these specifications for the construction project with a request for the drawings. Deviations from these specifications may compromise the quality of the constructed project, and therefore must not be made. Design analyses may be requested if required.